REMARKS

Applicants' attorney wishes to thank the Examiner for the courteous interview granted on April 27, 2004 to co-inventor Hannu Leino and the undersigned. During the interview, alkalinity stabilization during stock preparation within the paper mill was discussed with reference to the Leino declaration. This discussion readily distinguished the improvements of the invention, and it is summarized herein.

With particular reference to figures 1 - 3 of the Leino declaration, the pulping operation and the pulp mill water circulation are shown on the left side of the figure, separated by the dotted line, from the stock preparation and paper mill water circulation (or white water circulation) shown on the right side of the figure.

Accordingly, the figures reflect the conventional separation of fluid flows in integrated mills. That is, the pulping fluid or water flows are recycled and retained in the operations of the fiber line of the pulp mill. This recycle and separation is assisted by the pressing of the pulp in the "Sunds Press" with recycle and discharge of the filtrate, as shown in the declaration figures. Thus, the pressed pulp is passed to the paper mill, or shipped to a remote paper mill in

a non-integrated plant, with very little of the pulp mill water.

On the other hand, the stock preparation flows comprising the white water and short circulation flows are recycled and retained in the paper mill. As noted above, very little of the pulp mill water is retained in the pressed pulp delivered to the stock preparation on the paper side. Of course, in non-integrated mills, the pulp is delivered to the paper mill and the invention is practiced in the paper mill.

With these differences in mind, the Examiner particularly requested further clarification that the pulping operation teachings in the Ostberg reference do not suggest the claimed invention and that the claims are directed to processes in the paper mill downstream of, or following, pulp preparation in the fiber or pulp mill.

The Ostberg reference is fully discussed in the response to the claim rejections. Accordingly, it is most convenient to first address the amendments in the claims. Each of the independent claims has been amended to specifically recite addition of the alkalinity increasing components "in the stock preparation" and "in a paper mill". Both of these phrases are supported throughout the specification.

The definition of the phrase "stock preparation" has been previously shown by the text submitted with the amendment dated December 23, 2002. Namely, "Papermaking Part 1, Stock Preparation and Wet End", page. 125, an extra copy being submitted for the Examiner's convenience. As noted in the text, in the papermaking art:

> "Stock preparation or 'stock prep' includes mechanical treatment of the stock before the machine chest, proportioning, and blending of the main stock components. Stock preparation begins with repulping or the dilution of pulp from integrated mill operations at the pulp storage towers and ends at the machine chest." (Emphasis added.)

This definition shows that the stock preparation takes place after the removal of water in the Sunds press and begins with the repulping or dilution of this pulp in the paper mill.

Consistent with this definition of stock preparation, the claim limitations have been further clarified by recitation of "a paper mill". That is, the stock preparation is indicated to occur in a paper mill as opposed to a pulp or fiber mill. The

combination of terms leaves no doubt as to the meaning of the claim limitation.

Lastly, it is noted that each of the independent claims references the achievement of a significant buffering effect and maintaining the pH at the desired level "from the addition of the feeds through the short circulation and formation of paper on the paper machine" or "the formation of the pulp suspension into a web". Thus, it is clear that stabilization of alkalinity has been provided in the paper mill in respect to the short circulation and the paper machine (claim 1) or the formation of the pulp suspension into a web (claims 11 and 13). Reference to the short circulation is supported throughout the specification. Example 2 particularly illustrates alkalinity control by addition of alkali and CO_2 to the pulp slusher in increased amounts as compared with reference Example 1, and it is noted in the last paragraph at page 6 that:

> "Because of the buffering effect of the combined NaOH and CO_2, the acidic conditions lower the pH only to pH 7.2. This is a suitable pH for the short circulation and there is no need for any pH control using NaOH."

It is respectfully submitted that the amended claims introduce no new issues, and comply with the

Examiner's request for more specificity in identification of application of the invention to the stock preparation in the paper mill to assure alkalinity control in the wet end of the paper making from the feed point of the alkali/CO_2 to the paper machine or the web formation.

Turning to the claim rejections, it is requested that the Examiner reconsider and withdraw the rejection of claims 1-7 and 9-13 under 35 USC 103(a) as unpatentable over Ostberg et al. with or without G.B. patent 815,527 with or without U.S. patent 6,086,714 to Plaskon et al. As noted above, the present invention is directed to alkalinity control in the paper mill downstream from the pulp or fiber mill.

Ostberg never mentions stabilization of pH through increased alkalinity or alkalinity control as contemplated in the present invention. As the Examiner is aware, pH regulation does not necessarily mean alkalinity control. That is, pH regulation per Ostberg merely contemplates the addition of alkali or acid to achieve a target pH at particular process locations. For example, Ostberg merely teaches adding an alkali to increase an undesirably low pH. In contrast, the invention contemplates the addition of both alkali and

CO_2 to achieve increased alkalinity as well as the target pH.

As discussed during the interview, Ostberg is particularly directed to processing in the fiber line of the pulp mill. This is clear from the title of the article and the description of processing in "Fibre line 1" and "Fibre line 2". The Summary states:

> "Carbon dioxide (CO_2) can be used for pH adjustments and to improve the washing performance in the production of sulphate pulp."

Ostberg does not address increasing alkalinity to achieve buffering and increased resistance to pH change. Ostberg does not relate to the production of paper.

In Ostberg, all the addition points, CO2 and alkali (when added), are clearly in the fiber line. Since the alkalinity is a property of the aqueous phase of the pulp suspension, any alkalinity created in Ostberg would be retained in the fiber line when the pulp from the fiber line is dewatered and the excluded water is circulated back to the fiber line. As discussed during the interview, the pressing of the pulp so as to remove the pulp mill water before passing the pulp to the stock preparation in the paper mill is inconsistent with alkalinity control downstream. For

this reason, it is not plausible to construe Ostberg's fiber line processing to teach or suggest alkalinity control in the stock preparation in the paper mill, as discussed during the interview.

The pulp entering the paper mill has been dewatered and, as such, has a very low alkalinity and therefore, although it may have an even pH at about 8, this pH does not provide a sufficient alkalinity to maintain the pH of the pulp (and the whitewater) at an even value if chemical additions and treatments affecting the pH are made in the stock preparation. The Leino declaration notes that the pulp leaving the fiber mill has very low alkalinity (buffering ability), both under conventional processes or under the "AGA Pulp Wash System" referred to in Ostberg.

It should be appreciated that the alkalinity in the suspension in the stock preparation will actually be provided by the water (whitewater) which is used to dilute the pulp in the stock preparation and in the short circulation so that at the end, in the short circulation the pulp suspension contains about 1% or less fibers and about 99% water. Accordingly, one skilled in the art would not construe Ostberg's fiber mill processes to teach or suggest alkalinity control in the stock preparation.

The carbon dioxide added in the fiber line in Ostberg has two effects on the pulp suspension in the fiber line. It lowers the pH of the pulp and it creates an inherent, although low, buffering effect in the aqueous suspension and in the water circulation in the fiber line. The buffering provides an even pH of the pulp suspension in the fiber line. This is described by Ostberg on page 515 of the article.

The buffering effect is created in the aqueous medium of the fiber line. It causes the pH of the pulp being fed to the paper mill to have an even pH. It is evident that this is a benefit for the paper production since fluctuations in the incoming pH would automatically make it difficult to provide an even pH in the paper mill. Thus, the even pH is a benefit for the paper mill as stated by Ostberg.

Ostberg does not say that the buffering extends to the paper mill. Ostberg says that the low pH of 8 is a benefit for the paper mill.

This low pH does not, however, mean that the pulp suspension has an increased alkalinity. The alkalinity is a property of the aqueous phase of the pulp suspension and since the water has been largely retained in the fiber line, the pulp suspension in the stock preparation will have the alkalinity of the water

circulation of the stock preparation. It is the stock preparation pulp that the invention stabilizes against pH fluctuations. This stabilization is done in the stock preparation by greatly increasing the alkalinity by adding the combination of components of the present invention. This increased alkalinity provides a pH which is the desired one even though the further processing also contemplates adding chemicals or otherwise treating the pulp in the stock preparation in a manner which tends to change the pH up or down.

In the interview, the Examiner particularly requested clarification of the Ostberg statement at page 515: "Advantages can also be found in the lower pH in the pulp to the paper machine". Due to the lower pH, the fibers are shrunk when entering the paper mill and if they are beaten (refined) at that pH, this is beneficial for the beating as also mentioned by Ostberg at page 515. The quoted statement does not relate to buffering capacity since such does not per se have an effect on the fibers. However, the low pH directly affects the fibers of the pulp suspension in the fiber mill as it reduces their swelling, as mentioned by Ostberg in the last paragraph at page 509.

In further confirmation of the foregoing reading of Ostberg, reference is again made to the previously

filed Ostberg declaration, and particularly, to paragraph 15 wherein it is stated that no CO_2 was added to the stock preparation. Thus, Ostberg did not provide an increased alkalinity in the stock preparation by adding CO_2 and alkali in the stock preparation as set forth in the claims of the present invention.

Referring to paragraph's 10 and 11 of the Ostberg declaration, it is stated that the alkali was used by the mill now and then to control the pH at the time before the test runs with carbon dioxide washing were started. When the carbon dioxide pulp wash started, the mill found that the pH of the pulp was in control without alkali since the CO_2 amount adjusted the pH to about 8. This is what Ostberg describes at page 515 of the reference.

Frankly, Ostberg did not increase the alkalinity of the paper mill pulp in the stock preparation by adding either carbon dioxide or alkali to the stock preparation of a paper machine. There is no reasonable, or even plausible, interpretation of Ostberg that suggests the same.

It is submitted that the secondary references do not remedy the foregoing deficiencies of Ostberg. G.B. 815,247 does not teach or suggest a significant

buffering effect that lasts throughout from the feed points through "the short circulation and formation of paper on the paper machine" or "the formation of the pulp suspension into a web". Furthermore, any buffering achieved in the '247 patent is overcome in the subsequent bleaching and acidification steps. (See page 2, lines 51-112, especially lines 103-107). Thus, the '247 patent actually teaches away from the claimed invention.

Assuming *arguendo* that Plaskon et al. is prior art, it merely teaches the addition of carbon dioxide to a broke pulping slurry. There is no teaching of increasing alkalinity to control pH in the stock preparation and paper making process as defined in the claims.

For all of the reasons indicated above, it is further submitted that the rejection of claim 8 is also in error and should be withdrawn.

Claims 1-13 are in condition for allowance and such action is requested.

If there are any further fees required by this amendment not covered by the enclosed check, or if no check is enclosed, please charge the same to Deposit Account No. 16-0820, Order No. 32107.

Respectfully submitted,

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CHAPTER 5

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Stock and water systems of the paper machine

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1 Definitions

The following terms are commonly used to specify certain areas and systems as part of the entire paper mill water system:

Short circulation: The system in which paper machine wire water is separated from the stock in web forming and used for dilution of the thick stock to be delivered to the headbox.

Long circulation: The system in which excess white water from the short circulation and other waters are collected at the paper machine (PM) and used for stock dilution and other purposes in stock preparation. Within the long circulation loop, usually fiber recovery and water cleaning equipment is installed.

Approach flow system: The system extends from the machine chest to the headbox lip. The main purpose is to meter and dilute the stock including blending with other components like fillers, chemicals, and additives unless not already added in stock preparation. Then, the low-consistency stock is pumped and screened before feeding to the headbox. Stock cleaning by hydrocyclones and deaeration can be included.

Stock preparation: Stock preparation or "stock prep" includes mechanical treatment of the stock before the machine chest, proportioning, and blending of the main stock components. Stock preparation begins with repulping or the dilution of pulp from integrated mill operations at the pulp storage towers and ends at the machine chest.

2 Design principles

2.1 Elements and operations

The purpose of the stock and water systems is to supply the paper machine (PM) with stock and water in such way that

- The quantity of supplied stock is sufficient for the production capacity of the PM
- The supply is even and of such quality in order to reach a high PM productivity
- The product at the reel meets the given quality parameters.

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Papermaking Part 1, Stock Preparation and Wet End

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